

Chemistry: Unit 1: Lab Safety & Techniques: Lab #3 : Significant Figures & Measurement

Background: The concept of significant figures and its application to measurement is often difficult to understand. This lab is designed to relate measurement to significant figures and computation.

Most numbers used in chemistry are obtained from measurements. Exceptions include form defined quantities and counts. No measurement can be made exactly. The accuracy of the measurement is determined by the instrument being used. As science has progressed, its ability to make increasingly accurate measurements has increased. This lab is designed to familiarize you with the relationship between measurements and the instrument being used to make the measurement. Operations using significant figures are explored as well. Your instructor will review the rules for working with significant figures prior to the lab.

Question: Which instruments will be the most accurate and how will that effect the number of significant figures used in calculations?

Objective:

1. To relate the accuracy of the measurement being made to the instrument being used.
2. To develop skills in using various balances.
3. To develop skills in using significant figures.

Materials:

3 homemade rulers rectangular block calculator 3 sets of balances

Procedure:

1. Record a hypothesis to answer the question.
2. Create a data page to record any data collected. It could look something like this (make sure to include a table for rulers and balances):

Measurement	Ruler/Balance #1	Ruler/Balance #2	Ruler/Balance #3
Width			
Height			
Depth			
Weight			
Volume			
Density			

3. Cut out the 3 rulers found at the back of this lab.
4. Obtain a rectangular block from the supply cart.
5. Measure the length, width, and height of your block to the appropriate number of significant figures using ruler #1. Use your best judgment in estimating fractional units. Record your results.
6. Repeat step 5 using rulers #2 and #3. Record your results.
7. Using the three balances present, determine the mass of the rectangular block to the appropriate number of significant figures. Record your data.

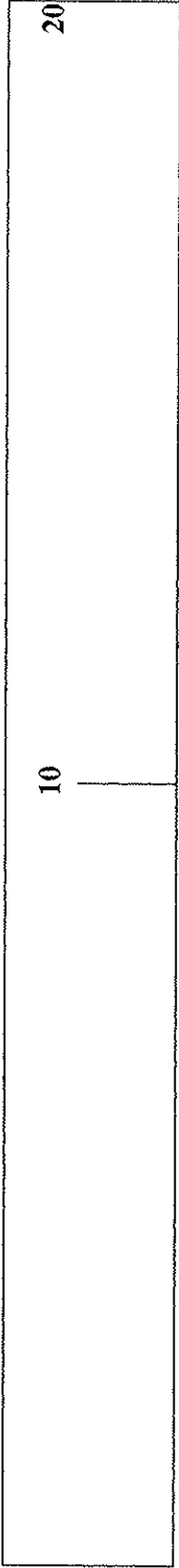
Data Analysis:

- a. Using the measurements obtained from each ruler, calculate the volume of the rectangular block to the correct number of significant figures. Record this figure for each ruler.
- b. Using the volume obtained in step a and the weight from step 7, determine the density of the block (use volume 1 with balance 1, etc.).
- c. Assuming that the density obtained using balance 3 and ruler 3 is the accepted value and the density obtained using balance 1 and ruler 1 is the observed value, calculate the percentage error.

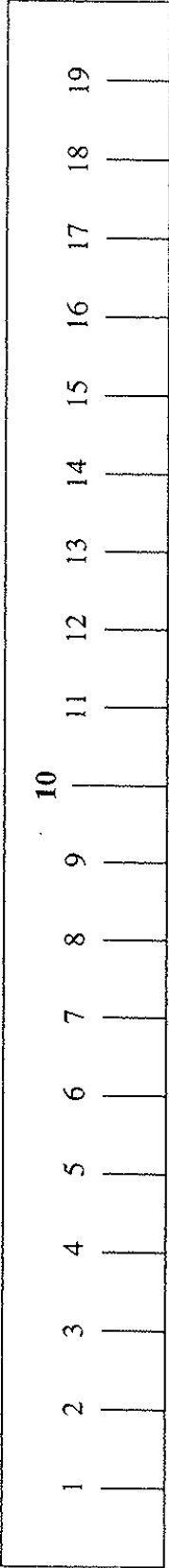
Questions:

1. What indicates the number of significant figures you should use?
2. How many significant figures are in each of the following:
 - a. 0.0056
 - b. 1.098
 - c. 89.90
 - d. 104.0990
 - e. 0.1205
 - f. 1,000,000.000
 - g. 12
 - h. 90
 - i. 0.000001
 - j. -1.10

RULER 1



RULER 2



RULER 3

